

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
16 January 2003 (16.01.2003)

PCT

(10) International Publication Number  
**WO 2003/004820 A3**

(51) International Patent Classification<sup>7</sup>: **E21B 19/16,**  
23/10, 43/10

(21) International Application Number:  
PCT/US2002/020477

(22) International Filing Date: 26 June 2002 (26.06.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/303,711 6 July 2001 (06.07.2001) US

(71) Applicant (for all designated States except US): ENVENTURE GLOBAL TECHNOLOGY [US/US]; 16200 A. Park Row, Houston, TX 77084 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **COOK, Robert, Lance** [US/US]; 934 Caswell Court, Katy, TX 77450 (US). **RING, Lev** [RU/US]; 14126 Heatherhill Place, Houston, TX 77077 (US). **BRISCO, David, Paul** [US/US]; 405 Westridge Drive, Duncan, OK 73533 (US).

(74) Agents: **MATTINGLY, Todd et al.**; Haynes & Boone, L.L.P., Suite 4300, 1000 Louisiana Street, Houston, TX 77002-5012 (US).

(81) Designated States (*national*): AF, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

Published:

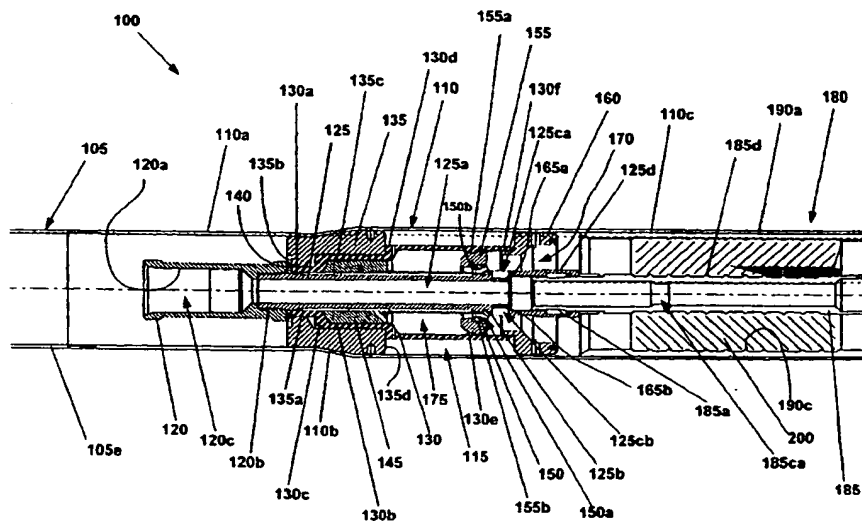
— with international search report  
— with amended claims

(88) Date of publication of the international search report:  
24 December 2003

Date of publication of the amended claims: 19 February 2004

[Continued on next page]

(54) Title: LINER HANGER



(57) Abstract: An apparatus (100) and method for forming or repairing a wellbore casing by radially expanding a tubular liner (105).

**BEST AVAILABLE COPY**

WO 2003/004820 A3

[received by the International Bureau on 05 December 2003 (05.12.03);  
original claims 1 and 5 amended; new claims 7-22 added;  
remaining claims unchanged (4 pages)]

What is claimed is:

12

1. 1. A method of coupling a radially expandable tubular member to a preexisting structure, comprising:
  - positioning the tubular member and an expansion device within the preexisting structure;
  - injecting fluidic materials into the tubular member;
  - sensing the operating pressure of the fluidic materials; and
  - radially expanding the tubular member into contact with the preexisting structure when the sensed operating pressure exceeds a predetermined amount by displacing the expansion device relative to the tubular member
2. The method of claim 1, wherein sensing the operating pressure includes:
  - sensing the operating pressure of the fluidic materials within the tubular member.
3. An apparatus for coupling a radially expandable tubular member to a preexisting structure, comprising:
  - a first tubular support member including a first internal passage;
  - an expansion cone assembly including:
    - a second tubular support including a second internal passage operably coupled to the first internal passage, one or more radial openings, and a first releasable coupling;
    - one or more pressure relief valves positioned in corresponding ones of the radial openings; and
    - one or more annular expansion cones coupled to the second tubular support;
  - an expansion cone launcher coupled to the annular expansion cones and the radially expandable tubular member; and
  - a shoe assembly, comprising:
    - a third tubular support member including a third internal passage operably coupled to the second internal passage and having a restriction, and a second releasable coupling releasably coupled to the first releasable coupling.
4. The apparatus of claim 3, wherein the expansion cone assembly includes a plurality of spaced apart annular expansion cone

10. The apparatus of claim 9, wherein one or more of the expansion members comprise annular expansion cones.
11. The method of claim 1, wherein, prior to the radial expansion and plastic deformation of the tubular member, the tubular member comprises:
  - a tapered portion;
  - a non-tapered portion coupled to an end of the tapered portion; and
  - another non-tapered portion coupled to another end of the tapered portion.
12. The apparatus of claim 3, wherein the expansion cone launcher comprises:
  - a tapered tubular portion.
13. The system of claim 5, wherein, prior to the radial expansion and plastic deformation of the tubular member, the tubular member comprises:
  - a tapered portion;
  - a non-tapered portion coupled to an end of the tapered portion; and
  - another non-tapered portion coupled to another end of the tapered portion.
14. The method of claim 1, wherein the tubular member comprises:
  - a wellbore casing.
15. The method of claim 1, wherein the tubular member comprises:
  - a pipeline.
16. The method of claim 1, wherein the tubular member comprises:
  - a structural support.
17. The apparatus of claim 3, wherein the tubular member comprises:
  - a wellbore casing.
18. The apparatus of claim 3, wherein the tubular member comprises:
  - a pipeline.
19. The apparatus of claim 3, wherein the tubular member comprises:
  - a structural support.
20. The system of claim 5, wherein the tubular member comprises:
  - a wellbore casing.